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Pinzari, M.; Pinzari, M.

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The genus *Hypsotropa* Zeller, 1848 in Italy and description of *H. aenigmatica* Pinzari & Pinzari, sp. n. (Lepidoptera: Pyralidae, Phycitinae, Peoriini)

M. Pinzari & M. Pinzari

Abstract

A description of *Hypsotropa aenigmatica* Pinzari & Pinzari, **sp. n.**, is given based on one male collected in Tuscany (Italy). A distribution review of the genus *Hypsotropa* Zeller, 1848 in Italy is presented: *Hypsotropa unipunctella* Ragonot, 1888 in North-East; *Hypsotropa limbella* Zeller, 1848, in the northern half of the peninsula; *Hypsotropa roseostrigella* Ragonot, 1901, in Sardinia; *Hypsotropa vulneratella* (Zeller, 1847) in the southern half of the peninsula, in Sicily and in Sardinia. Based on our study it follows that *Hypsotropa gallohispanicella* Leraut, 2019 = *H. roseostrigella* Ragonot, 1901, **syn. n.**

KEY WORDS: Lepidoptera, Pyralidae, Phycitinae, Peoriini, *Hypsotropa*, Italy.

El género *Hypsotropa* Zeller, 1848 en Italia, con la descripción de *H. aenigmatica* Pinzari & Pinzari, sp. n. (Lepidoptera: Pyralidae, Phycitinae, Peoriini)

Resumen

Se describe una nueva especie *Hypsotropa enigmatica* Pinzari & Pinzari, **sp. n.**, basada sobre un macho encontrado en la Toscana (Italia). Se revisa la distribución del género *Hypsotropa* Zeller, 1848 en Italia: *Hypsotropa unipunctella* Ragonot, 1888 en el noreste; *Hypsotropa limbella* Zeller, 1848, en la mitad norte de la península; *Hypsotropa roseostrigella* Ragonot, 1901, en Cerdeña; *Hypsotropa vulneratella* (Zeller, 1847) en la mitad sur de la península, en Sicilia y en Cerdeña. Sobre la base de nuestro análisis, se concluye que *Hypsotropa gallohispanicella* Leraut, 2019 = *H. roseostrigella* Ragonot, 1901, **syn. n.**

PALABRAS CLAVE: Lepidoptera, Pyralidae, Phycitinae, Peoriini, *Hypsotropa*, Italia.

Introduction

Prior to the current study, the genus *Hypsotropa* in Italy included four species: *Hypsotropa unipunctella* Ragonot, 1888 in the North-East (DEUTSCH, 2006); *Hypsotropa limbella* Zeller, 1848 in the northern half of the peninsula (DELLA BEFFA, 1940; BALDIZZONE *et al.*, 2013; HARTIG, 1958; PARENTI, 1962, 2000; TURATI, 1979) up to Umbria (PINZARI *et al.*, 2016); *Hypsotropa vulneratella* (Zeller, 1847), in southern Latium (LERAUT, 2019), in Calabria (SCALERCIO *et al.*, 2016), in Sicily (ZELLER, 1847; MARIANI, 1939; GASTÓN *et al.*, 2016) and in Sardinia (GASTÓN *et al.*, 2016; HARTIG & AMSEL, 1951), with *H. vulneratella* var. *roseostrigella* Ragonot, 1901 in Sicily (MARIANI, 1939) and in Sardinia (HARTIG & AMSEL, 1951); *H. roseostrigella* Ragonot, 1901 in Sardinia (GASTÓN *et al.*, 2016).

In the context of an ongoing survey of the Lepidoptera fauna in Italy (PINZARI, 2016, 2019a, 2019b; PINZARI & PINZARI, 2019 a, 2019 b, 2019 c, 2020; PINZARI *et al.*, 2016, 2018, 2019) we collected a moth that was previously determined as *Hypsotropa vulneratella* (Zeller, 1847) var.

roseostrigella Ragonot 1901. Successively, according to the recent taxonomic review of the genus *Hypsotropa* (GASTÓN *et al.*, 2016) it was not possible to ascribe our finding to any species.

Materials and methods

Collecting site: The present study is based on the examinations of a male attracted by a lamp (Mixed Light 160 W) at Capalbì Scalo (GR) in Tuscany (Italy) and collected on 27-VI-2007 by Mario Pinzari (fig.1). The moth was collected from a small meadow at sea level placed among the dune, an artificial pine forest, a fish farm and a small reed swamp area of *Phragmites australis* (Cav.) Trin. ex Steud. The collecting site was visited by us for many years and although it is a anthropized and apparently degraded place, it is rich in interesting lepidopterans species including *Mythimna pudorina* ([Denis & Schiffermüller], 1775) (Noctuidae), *Laelia coenosa* (Hübner, [1808] 1796) (Erebidae) and *Cochylimorpha decolorata* (Zeller, 1839) (Tortricidae). A few hundred meters from this place in the driest areas, we also find *Coenonympha elbana* Staudinger, 1901 (Nymphalidae). Among vertebrates, in the study area the mammalian *Lutra lutra* Linnaeus 1758 also lives in the agricultural channels.

Genitalia dissection and preservation: The male genitalia were boiled in 10% potassium hydroxide solution for few minutes and mounted on a slide to make a photography. Successively, the slide was dismantled to preserve the genitalia. Genital parts were glycerol-preserved into microtubes. These were closed with vinyl glue that is easily soluble in water and put under the specimen itself. The specimen is deposited in the private collection of Mario Pinzari (Rome, Italy).

Species identification: The moth species was studied examining the external habitus and the genital features using the taxonomic characters reported by GASTÓN *et al.* (2016).

Abbreviations

BMNH collection - The Natural History Museum, London, Great Britain

ZMUC collection - Zoologisk Museum, Copenhagen, Denmark

MZUR Hartig collection - Museo Zoologico Università di Roma “La Sapienza”, Italy

Italian records of *Hypsotropa* species

To show an updated distribution of *Hypsotropa* group in Italy, we mapped the localities of Italian specimens cited in literature adding the records not reported by GASTÓN *et al.* (2016) and our collecting site. For the distribution map, we processed the figure 37 reported in GASTÓN *et al.* (2016) and we mapped only the records of *Hypsotropa* in Italy (fig. 2). Below we cited the Italian records that were not reported by GASTÓN *et al.* (2016).

Hypsotropa unipunctella Ragonot, 1888

Hypsotropa unipunctella Ragonot, 1888. *Nouv. Phycitidae*: 47

LT: Amour [Amur], CHINA

FRIULI VENEZIA GIULIA: Tagliamento River in the surroundings of Gradisca, Spilimbergo, (PD), 100 m, 17-VIII-1996, A. Mayr leg. (DEUTSCH, 2006).

Hypsotropa limbella (Zeller, 1848)

Anerastia limbella Zeller, 1848. *Isis von Oken*, **1848**(8): 591

LT: Schneeberge am Alpensteig, ALEMANIA

PIEMONTE: Alpi Marittime, Colle S. Bernardo (CU), VIII-1932, (DELLA BEFFA, 1940); woods below Cascina Bano (AL), 300 m, 12-VII-2005 (BALDIZZONE *et al.*, 2013). LOMBARDIA: Alzate Brianza (CO) (TURATI, 1879, in PARENTI, 1962); TRENTINO ALTO ADIGE: San Vigilio-Gardole (BZ), 1 ♂, 2 ♀♀, 29-VII-1941, 2 ♀♀, 8-VIII-1942, 1 ♂, 23-VII-1943, Hartig leg. (MZUR), (HARTIG, 1958). LIGURIA: Sanremo (IM), (PARENTI, 1962); TOSCANA: Quercianella (LI), (PARENTI, 1962); UMBRIA: 1 ♂, Monte

Subasio, Cà Piombino (PG), 470 m, 1-VII-2006 (gen. praep. PIRA 295, M. Pinzari), Z. and I. Zerunian leg. (PINZARI *et al.*, 2016); ABRUZZO: Vacri (CH), 300 m, 21-VII-1954, 2 ♂♂ (PARENTI, 1962, 2000).

Hypsotropa vulneratella (Zeller, 1847)

Epischmia vulneratella Zeller, 1847. *Isis von Oken*, **1847**(10): 769

LT: Syracus [Syracuse], Sicily, ITALY

SICILIA: 1 ♂ (Syntype), Messina, 11-VII-1847, Zeller leg., BMNH collection, 1 ♂, idem, 11-VII-1847, 1 ♂, idem, 12-VII-1847; as *H. ichorella* Lederer, 1855, Pizzo Assolicchiata at Pizzo dell'Aquila, Monreale (PA), (MARIANI, 1939). 1 ♂, Monte Etna, Milo, 650 m, 7-VI-2005, Peder Skou leg, ZMUC collection; 1 ♂, Siracusa, 21-VI-1847 (GASTÓN *et al.*, 2006); as *H. ostrinella*, La Harpe, 1861 (LA HARPE, 1860). SARDEGNA: *Hypsotropa vulneratella* Z: Sa Casa (NU), 21-27-VII; Sadali (NU), 5-VII; Ortuabis (NU), 3.-III; Taccu Zippiri (NU), 5-VIII; Macomer (NU), 14-VIII (HARTIG & AMSEL, 1951). 1 ♂, Siniscola (NU), Tiliò, 3 m, 27-VI-2004 J. Skyva leg. and coll. (GASTÓN *et al.*, 2006). CALABRIA: 2 ♂♂, Fiego di San Fili, San Fili (CS), Catena costiera, 720 m, 22-VII-2015; 1 ♂, Montagna Grande, San Giovanni in Fiore, Sila, 1355 m, 17-VII-2015, (SCALERCIO *et al.*, 2016). LAZIO: 1 ♂, Anagni (LERAUT, 2019).

Hypsotropa roseostrigella Ragonot, 1901

Hypsotropa vulneratella var. *roseostrigella* Ragonot, 1901. *Rom. Mem.*, **8**: 379, pl. 39, fig. 12

LT: Syrie [SYRIA]

SARDEGNA: *Hypsotropa vulneratella* forma *roseistrigella* Rag. Z: Sa Casa (NU), 21-27-VII; Sadali, (NU), 5-VII; Ortuabis (NU), 3-VIII; Taccu Zippiri (NU), 5-VIII; Macomer (NU), 14-VIII (HARTIG & AMSEL, 1951); 1 ♂, Aritzo, Sa Casa, 21-VII-1936, H. G. Amsel leg. (GASTÓN *et al.*, 2016); SICILIA: "tutta", IV-VI, var. *roseistrigella* Rag. (MARIANI, 1939).

Material examined: SARDEGNA: Aritzo dint. Cant.sa Casa, 950 m, 4 ♂♂, 24-VII-1936, 2 ♂♂, 29-VII-1936, Conte Hartig leg. (MZUR); 1 ♂, Sardegna centr., Cant. Ortuabis 700 m, 30-VII-1936, 1 ♂, 31-VII-1936, 2 ♂♂, 3-VIII-1936, Conte Hartig leg. (MZUR).

Differences of *Hypsotropa* sibling species: In Italy the genus *Hypsotropa* included four species: *Hypsotropa unipunctella*, *Hypsotropa limbella*, *Hypsotropa vulneratella* and *H. roseostrigella*. *H. limbella* and *H. unipunctella* the species are easily distinguished from each other and from the other species by their typical habitus. *Hypsotropa vulneratella*, *H. roseostrigella* and *H. vazquezi* were considered as *vulneratella* before GASTÓN *et al.* (2016). Recently, these authors rearranged *Hypsotropa* species identifying those three different species according to their genital characters and habitus. As the habitus concerns, an important diagnostic feature is the area covered by purple pink-coloured scales of the upper surface of forewings. The characteristics of the habitus are common to both males and females (for details see in GASTÓN *et al.* (2016). Our diagnosis only refers to males because we never collected females.

H. vulneratella have slender, rather blunt, forewings with a reddish background colour, in which the pale yellow veins stand out in a very variable way. The yellow colour of the veins and their contrast of colour on the red background allow to distinguish *H. vulneratella* from the other two species *H. roseostrigella* and *H. vazquezi*. The most important genital feature in male of *H. vulneratella* is the shape of the valva that is triangular, with a wide base and pointed at the pollex, sometimes more rounded; near the base, the valva has a little saccular appendix with the lower outer margin of the valve clearly straight up to the apex. Moreover, the gnathos is very conspicuous, rectangular, with the top cap slightly pointed at its central part. In bilobar uncus, the arms are slightly curved, equal in width in all its extension, ending in an eagle peak form.

H. roseostrigella has pale yellow forewings and almost white hind wings. A characteristic of this species is the presence of three bands of pink-purple scales that splay longitudinally from the base to the outer edge of the wings. This wing peculiarity, which is clearly seen in fresh samples, allows to clearly distinguish *H. roseostrigella* from congeneric species. As genitalia concern, *H. roseostrigella* shows a triangular valva, narrower than *H. vulneratella*, with its end finger shaped (rounded and not pointed); near the base it has a characteristic saccular appendix, larger than *H. vulneratella*, strongly sclerotized and pointed extended. The lower external margin of the valva presents an evident convexity

between the saccular process and the apex. The gnathos is small and pointed, unlike that of *H. vulneratella*, which is more evident and rectangular in shape.

H. vazquezii has the forewings with slightly rounded apices; straw yellow colour upper face of forewings, its colour varies slightly to a more tanned yellow, with no sign except the veins, covered by light coloured scales. The area of the wing included behind the discal cell at the dorsal margin is shaded in its entirety by a more or less variable diffusion of red-purple scales. The hindwings are almost white cream colour, with no evident spots. Genitalia fit the model described for the genus *Hypsotropa* with a bilobar uncus formed by two elongated arms, with pointed end and beak-shaped of eagle. The gnathos is very conspicuous and rectangular shaped with its top end straight or slightly lobed. The valve is simple, triangular shaped and slightly pointed. They do not have a clasper. They have a very sclerotized appendix or lobe in the shape of a pin at the edge of the sacculus, at its closest part to the vinculum. The costal margin is slightly convex.

Results

Hypsotropa aenigmatica Pinzari & Pinzari, sp. n.

Material examined: Holotype male: ITALY, TUSCANY, Capalbio Scalo (Grosseto), 1 ♂ (gen. praep. PIRA 574 M. Pinzari), 27-VI-2007, M. Pinzari leg. (deposited in the collection of second author, Rome, Italy) (fig. 1).

Description Male (figs 1a, b, c, d): Imago. Wingspan 18 mm. Antennae filiform, serrated, orange; head light yellow, forehead light yellow with longer orange scales towards the palps; palps straight, not curved at the tip, longer than the torax, yellow on the inside and on the outside yellow down and dark orange on the top. Torax yellow; tegulae yellow, slightly edged with orange externally. Forewings upperside (fig. 1a): upper edge of the wing red brown near the base; ground colour orange; veins of the upper part covered with yellow scales; in the lower half of the wings, three stripes (one on the lower edge) of darker almost purple orange scales, go through the wing longitudinally up to the outer edge, yellow fringes; hindwings, different colour from forewings, light brown, brownish, concolorous fringes. Underside (fig. 1c): forewings, yellowish at the top and at the base, brownish in the central longitudinal area; hindwings, brownish in the upper part that fades to yellow in the lower part, concolorous fringes. Four forelegs are red-brown; brighter two hind legs. Genitalia (figs 1b and 1d). Valvae are triangular (fig. 1b) with wide base and narrow but rounded vertex; saccular appendix almost absent and not emerging, barely hinted and not very sclerified, towards the base on the posterior border; edeago with a wide break on one side of the crown; gnathos (fig. 1d) depressed at the tip, bilobed; long, double-lobed uncus with curved tips at the tip of an eagle's beak form. Female: unknown

Biology: unknown.

Etymology: The name of the new species derives from aenigma (mystery in Latin). The male, previously determined as *H. vulneratella* var. *roseostrigella*, after the clarifying work of GASTÓN *et al.* (2016) had remained enigmatic for a long time. Despite the research carried out since then in the same places, we have not been able to find other specimens and therefore, based on the clarity of the characters and biogeographical characteristics of the genus in Italy, we decided to describe the new species without delaying further.

Hypsotropa roseostrigella Ragonot, 1901

Hypsotropa vulneratella var. *roseostrigella* Ragonot, 1901. *Rom. Mem.*, **8**: 379, pl. 39, fig. 12

LT: Syrie [SYRIA]

= *Hypsotropa gallohispanicella* Leraut, 2019. *Rev. Fr. Ent. Gén.*, **1**(1): 27, figs 13, 17, 21), **syn. n.**

LT: Le Lavandou, Var, FRANCE

In 2019 *H. roseostrigella* Ragonot, 1901 has been placed into synonymy with *H. vulneratella* (Zeller, 1847). *Hypsotropa roseostrigella* Ragonot, 1901 sensu F. J. Gastón, R. Macià, J. Ylla & M. Huertas-Dionisio, 2016 was renamed as *Hypsotropa gallohispanicella* Leraut, 2019 designating it as the new holotype specimen for France (LERAUT, 2019).

But, in literature we found that *H. ichorella* Lederer, 1855 was collected in July in Monreale (PA) (MARIANI, 1939) and *H. ostrinella* La Harpe, 1861 (LA HARPE, 1860) was known for Syracuse, and these species are considered as synonyms of *vulneratella* by RAGONOT (1901), LERAUT (2014) and GASTÓN *et al.* (2016). Moreover, MARIANI (1939) cited *vulneratella* var. *roseostrigella* as is present from April to June in the whole Sicily. These records in Sicily for the genus *Hypsotropa* showed that both *H. vulneratella* and *H. roseostrigella* are present in the isle and GASTÓN *et al.* (2016) defined the novo status of *H. roseostrigella* Ragonot, 1901. Therefore, it follows that *Hypsotropa roseostrigella* Ragonot, 1901 = *Hypsotropa gallohispanicella* Leraut, 2019, **syn. n.**

Remarks

MORPHOLOGICAL DIFFERENCES: *H. AENIGMATICA* VERSUS *H. ROSEOSTRIGELLA*, *H. VULNERATELLA* AND *H. VAZQUEZI*

H. aenigmatica is very similar to the species of *Hypsotropa* genus and looks like a mosaic composed of pieces of the other three species. At a first macroscopic examination, the salient feature is represented by the three lines of pinkish scales of the upper surface of forewings, that are typical of *H. roseostrigella*. The specimens of *H. roseostrigella*, collected in Sardinia (N = 10 ♂) and preserved in Hartig's collection (MZUR), have a mean wing span equal to 17.8 mm (Range: 15 - 21 mm) and the stripes are much more defined than *aenigmatica*. On closer inspection, however, it is noted that in the upper half of the wing, the background is orange and veins covered with yellow scales emerge on it; this is a characteristic typical of *H. vulneratella*. Even the hindwings, although darker in the new species, have the same colour as *roseostrigella*. On the underside of forewings the new species, has even darker areas. Even the genitals do not have any characteristic typical of the species, but the specificity also is here in the presence of characters of all the other three sister species: the shape of the valves is clearly that of *H. vulneratella*, triangular, with a broad base, pointed but rounded at the top, devoid or almost of the sacculus appendix, the edge from the appendix to the straight vertex; the well-pronounced and depressed bilobed gnathos is the same as *H. vazquezi*.

DISTRIBUTION: *H. AENIGMATICA* VERSUS *H. ROSEOSTRIGELLA*, *H. VULNERATELLA* AND *H. VAZQUEZI*

The finding of a new species in that area of the Tuscan coast (fig. 2) is not at all strange and the fact has encouraged us to describe it despite the uniqueness of the specimen. In fact, the Sardinian Corsican fauna and the fauna of our study area have in common at least two taxa, *Hipparchia neomiris* (Godart, 1822) and *Coenonympha corinna* (Hübner, [1804] 1796) (Nymphalidae), that are absent in the rest of Italy. *H. neomiris*, is an endemic species confined to the islands of Corsica, Sardinia, Elba and Tuscany; these populations, in addition to belonging to the same species, have the same habitus. Instead, *C. corinna*, present in Sardinia, is similar in habitus to *Coenonympha elbana* Staudinger, 1901 and for a long time considered as its sister species; *C. elbana* is also found in the same area where we collected *H. aenigmatica*.

In 2016 *H. vulneratella* was found in two locations in Calabria (SCALERCIO *et al.*, 2016). The published photo of a perhaps not very fresh specimen seems to show a habitus characterized by veins covered by evident yellow scales on a dark red background, typical of *H. vulneratella*. Furthermore, LERAUT (2019) described the male genitalia of a moth, clearly attributable to *vulneratella*, which was collected at Anagni in southern Latium.

This finding is very interesting and could suggest a possible connection with the new species along the Italian Peninsula, but we consider this unlikely due to the numerous surveys have been carried out on Lepidoptera in central Italy. They were both widespread and concentrated and continuous in several sites, e.g. in Castelporziano (RM) (PINZARI *et al.*, 2017) on the Lazio coast with habitats similar to that of finding of the new species; Assisi (PG) (PINZARI *et al.*, 2016); Monte Cagno (RI) (PINZARI *et al.*, 2010); La Maielletta (CH) (PARENTI, 1962). However, no species of the *H. vulneratella* group has been found.

H. aenigmatica is evidently a very localized species but it should take into account that the place of discovery is part of a larger area which has numerous, diverse and less altered habitats and ranges

from the Island of Elba to the Grosseto coast. This includes the vast protected area of the Orbetello lagoon where the new species could be present and more numerous.

Conclusions

The new species *Hypsotropa aenigmatica* Pinzari & Pinzari, sp. n. differs from the three similar and congeneric species, *H. roseostrigella*, *H. vulneratella* and *H. vazquezi* in having all together the specific and distinctive characteristics of these three species. In particular, the male of *Hypsotropa aenigmatica*, the only known specimen, has similar habitus of *H. roseostrigella*, i. e. it has the three bands of pink-purple scales that go longitudinally through the forewings, from the base to the outer edge, and it has the genitals with the valve of *H. vulneratella* and the gnathos of *H. vazquezi*. *H. aenigmatica* is only present in Tuscany, *H. vulneratella* in south-central part of the Italian peninsula and coexists in Sicily and Sardinia, but not in the same sites, with *H. roseostrigella*.

On the basis of our study, it follows that *Hypsotropa gallohispanicella* Leraut, 2019 is a new synonymy of *H. roseostrigella* Ragonot, 1901.

We deduced that the genus *Hypsotropa* is present in Italy with five species: *H. unipunctella* Ragonot, 1888, *H. limbella* Zeller, 1848, *H. roseostrigella* Ragonot, 1901, *H. vulneratella* (Zeller, 1847) and *H. aenigmatica* Pinzari & Pinzari, 2020. The latter two species are present in Europe only in Italy.

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*M. P.
Dipartimento di Biologia
Università di Roma Tor Vergata
Via della Ricerca Scientifica, 1
I-00133 Roma
ITALIA / ITALY
E-mail: manuela.pinzari@uniroma2.it
<https://orcid.org/0000-0003-0829-3453>

M. P.
Piazza Francesco Morosini, 12
I-00136 Roma
ITALIA / ITALY
E-mail: mario.pinzari@uniroma3.it
<https://orcid.org/0000-0002-5279-2092>

*Autor para la correspondencia / *Corresponding author*

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